

POSTER PRESENTATION

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Effects of low dose intravenous sodium nitrite on arterial oxygenation and hemodynamics in experimental acute respiratory distress syndrome (ARDS)

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Introduction

Nitrite (NO_2^-) is an endogenous storage pool for nitric oxide (NO) [1]. We showed that sodium nitrite (NaNO_2) mitigates ventilator-induced lung injury via NO dependent mechanisms in rats [2].

Objectives

We hypothesized that low dose intravenous (i.v.) NaNO_2 may improve arterial oxygenation and reduce mean pulmonary artery pressure (MPAP) and pulmonary vascular resistance (PVR) in ARDS in pigs.

Methods

ARDS was induced in 12 pigs by surfactant depletion due to saline lung lavages [3]. Two groups were investigated for 5 h: 1. Controls (n = 6) and 2. NaNO_2 i.v. (0.3 mg/kg

BW bolus, followed by 0.1725 mg/kg BW continuously; n = 6). We measured mean arterial pressure (MAP), MPAP and cardiac output as well as exhaled NO (NOex), blood gases and Wet/Dry-Ratios of lung tissue.

Results

At baseline the arterial oxygen tension (P_aO_2) was 539 ± 50 mmHg and 508 ± 35 mmHg in Controls and NaNO_2 i.v. respectively (fraction of inspired oxygen = 1.0). P_aO_2 decreased to 67 ± 17 mmHg (Controls) and 57 ± 13 mmHg (NaNO_2 i.v.) after ARDS induction. During the protocol, P_aO_2 increased to 120 ± 73 mmHg (Controls) and 103 ± 82 mmHg (NaNO_2 i.v.). NOex was unchanged in both groups. Lung Wet/Dry-Ratios were 8.1 ± 0.8 (Controls) and 8.9 ± 0.7 (NaNO_2 i.v.). For hemodynamic values see Table 1 (all values: mean \pm SD).

Table 1

Groups	TP	MPAP (mmHg)	PVR (dyn*s*cm-5)	MAP (mmHg)	SVR (dyn*s*cm-5)	CO (L/min)
Controls	T0	14 \pm 3	205 \pm 107	92 \pm 6	2157 \pm 520	3.5 \pm 0.9
	T1	33 \pm 6	360 \pm 97	74 \pm 13	966 \pm 212	6.2 \pm 0.7
	T2	27 \pm 5	243 \pm 78	67 \pm 10	798 \pm 196	6.6 \pm 0.9
NaNO_2 i.v. low dose	T0	15 \pm 1	185 \pm 26	90 \pm 13	1967 \pm 417	3.7 \pm 0.4
	T1	34 \pm 3	429 \pm 78	72 \pm 10	1092 \pm 293	5.1 \pm 0.5
	T2	29 \pm 6	284 \pm 82	68 \pm 11	816 \pm 320	6.9 \pm 1.6

Mean pulmonary artery pressure (MPAP), pulmonary vascular resistance (PVR), mean arterial pressure (MAP), systemic vascular resistance (SVR), cardiac output (CO) in control animals (Controls; n = 6) and in animals treated with low dose intravenous sodium nitrite (NaNO_2 i.v.; n = 6); Time point of measurement (TP): Baseline (T0); ARDS baseline (T1); End of experiment (T2); All values: mean \pm SD

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Conclusions

Lung lavage induced severe ARDS with increased MPAP and PVR in both groups. I.v. application of low dose NaNO₂ did not reduce lung edema formation and did not improve arterial oxygenation or pulmonary hemodynamics in this model of severe ARDS in pigs.

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References

1. Lundberg JO, Weitzberg E, Gladwin MT: **The nitrate-nitrite-nitric oxide pathway in physiology and therapeutics.** *Nat Rev Drug Discov* 2008, **7**(2):156-167.
2. Pickerodt PA, Emery MJ, Zarndt R, Martin W, Francis RC, Boemke W, Swenson ER: **Sodium nitrite mitigates ventilator-induced lung injury in rats.** *Anesthesiology* 2012, **117**(3):592-601.
3. Lachmann B, Robertson B, Vogel J: **In vivo lung lavage as an experimental model of the respiratory distress syndrome.** *Acta Anaesthesiol Scand* 1980, **24**(3):231-236.

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